Any element in a claim that does not explicitly state "means for" performing a specified function, or "step for" performing a specific function, is not to be interpreted as a "means" or "step" clause as specified in 35 U.S.C. 112 paragraph 6. In particular, the use of "step of" in the claims herein is not intended to invoke the provisions of 34 U.S.C. 112 paragraph 6.

What is claimed is:

1. A lightweight thermal heat transfer apparatus, comprising:

(a.) a core section, the core section being substantially similar to a diamond shape; and,

(b) a laminate composite section, the laminate composite section having a plurality of thermally conductive fibers, the thermally conductive fibers being disposed around the core section, the thermally conductive fibers being oriented at a configuration similar to the core section.

2. The lightweight thermal heat transfer apparatus of claim 1, wherein the thermally conductive fibers being supported in the laminate composite section with a matrix material, the matrix material being a material selected from the group of polymeric compositions, ceramic compositions and metallic compositions.

3. The lightweight thermal heat transfer apparatus of claim 2, wherein the lightweight thermal heat transfer apparatus has edges, the thermally conductive fibers are oblique to the edges.

4. The lightweight thermal heat transfer apparatus of claim 3, wherein the core section is a material selected from the group of foam, air, fluid, and honeycomb.

5. The lightweight thermal heat transfer apparatus of claim 3, wherein the core section is manufactured from a material that is polymeric based.

6. The lightweight thermal heat transfer apparatus of claim 5, wherein the thermally conductive fibers are manufactured from a material selected from the group consisting of mesophase pitch material and carbon fiber.

7. The lightweight thermal heat transfer apparatus of claim 6, wherein the thermally conductive fibers are supported by pitched-based fibrous reinforcements.

8. The lightweight thermal heat transfer apparatus of claim 7, wherein the lightweight thermal heat transfer apparatus is in substantially the shape of a rectangle.

9. A lightweight thermal heat transfer apparatus, comprising:

(a.) a core section, the core section being substantially similar to a diamond shape, the core section being manufactured from a material that is polymeric based; and,

(b) a laminate composite section, the laminate composite section having a plurality of thermally conductive fibers, the thermally conductive fibers being disposed around the core section, the thermally conductive fibers being oriented at a configuration similar to the core section, the thermally conductive fibers being imbedded in a matrix, the thermally conductive fibers being manufactured from mesophase pitch material, the thermally conductive fibers being supported by pitched-based fibrous reinforcements, the lightweight thermal heat transfer apparatus having edges, the thermally conductive fibers being oblique to the edges, the edges being coated with a conductive coating.

10. The lightweight thermal heat transfer apparatus of claim 9, the matrix being a material selected from the group of polymeric compositions, ceramic compositions and metallic compositions.

11. The lightweight thermal heat transfer apparatus of claim 10, wherein the conductive coating is manufactured from a material selected from the group consisting of metals, metal alloys and diamonds.

12. The lightweight thermal heat transfer apparatus of claim 11, wherein the plurality of thermally conductive fibers are orientated in a common direction.

13. The lightweight thermal heat transfer apparatus of claim 12, wherein, thermally conductive fibers, discontinuous and dispersed in the matrix, are in the translaminar (through-thickness) direction to further aid in heat dissipation.

14. The lightweight thermal heat transfer apparatus of claim 12, wherein, thermally conductive fibers, continuous and inserted through the thickness of the laminate, are in the translaminar (through-thickness) direction to further aid in heat dissipation.

15. The lightweight thermal heat transfer apparatus of claim 12, wherein the core section comprises of a stiffener, the core section having 4 apexes, the stiffener having a first end and a second end, the first end and second end of the stiffener being disposed at opposite apexes such that a stiffened apex region is created and the diamond shape of the core section is maintained.

16. The lightweight thermal heat transfer apparatus of claim 15, further comprising of a plurality of plies, the core section having a plurality of apexes, the plurality of plies attached to at least one of the apexes such that the plurality of plies give local area support and added heat transfer capabilities.

17. The lightweight thermal heat transfer apparatus of claim 16, further comprising of two groups of a plurality of plies, the core section having four apexes, one group of the plurality of plies are attached at one apex, and the other group of plurality of plies attached at an opposite apex.

18. A lightweight thermal heat transfer apparatus prepared by a process, comprising the steps of:

(a) fabricating an oval with thermally conductive fibers;

(b) cutting the oval into quadrants; and

(c) aligning the quadrants around a substantially diamond shaped core section such that the substantially diamond shape of the core section is maintained.

19. The lightweight thermal heat transfer apparatus of claim 18, wherein the thermally conductive fibers are manufactured from a mesophase pitch material, the mesophase pitch material is prepared by

(a) distilling pitch, and

(b) repeated stretching and exposure to temperature as high as 3500 degrees Celsius until the pitch is converted to graphite fibers that are in an intermediate stage.

20. The lightweight thermal heat transfer apparatus of claim 19, wherein the mesophase pitch material has a density in a range of about 2 to about 2.5 g/cc.

21. The lightweight thermal heat transfer apparatus of claim 20, wherein the mesophase pitch material has a thermal conductivity in a range of about 100 to about 1100 W/m degrees Kelvin.

22. The lightweight thermal heat transfer apparatus of claim 18, wherein the thermally conductive fibers are manufactured from carbon fiber.

23. The lightweight thermal heat transfer apparatus of claim 22, wherein the carbon fiber has a density of about 1.8 g/cc.

24. The lightweight thermal heat transfer apparatus of claim 23, wherein the carbon fiber has a thermal conductivity in a range of about 10 to about 70 W/m degrees Kelvin.

25. A lightweight thermal heat transfer apparatus prepared by a process, comprising the steps of:

(a) building a laminate ply-by-ply, the plies being manufactured from a thermally conductive fiber;

(b) staggering the ply lengths to exhibit a half diamond-like shape;

(c) building a second laminate; and

(d) bonding a diamond shaped core section to the two laminates.

26. The lightweight thermal heat transfer apparatus of claim 25, wherein the thermally conductive fibers are manufactured from a mesophase pitch material.

27. The lightweight thermal heat transfer apparatus of claim 26, wherein the mesophase pitch material has a density in a range of about 2 to about 2.5 g/cc.

28. The lightweight thermal heat transfer apparatus of claim 27, wherein the mesophase pitch material has a thermal conductivity in a range of about 100 to about 1100 W/m degrees Kelvin.

29. The lightweight thermal heat transfer apparatus of claim 25, wherein the thermally conductive fibers are manufactured from carbon fiber.

30. The lightweight thermal heat transfer apparatus of claim 29, wherein the carbon fiber has a density of about 1.8 g/cc.

31. The lightweight thermal heat transfer apparatus of claim 30, wherein the carbon fiber has a thermal conductivity in a range of about 10 to about 70 W/m degrees Kelvin.